

CS144

An Introduction to Computer Networks

What the Internet is

A very brief history of networking
and the Internet



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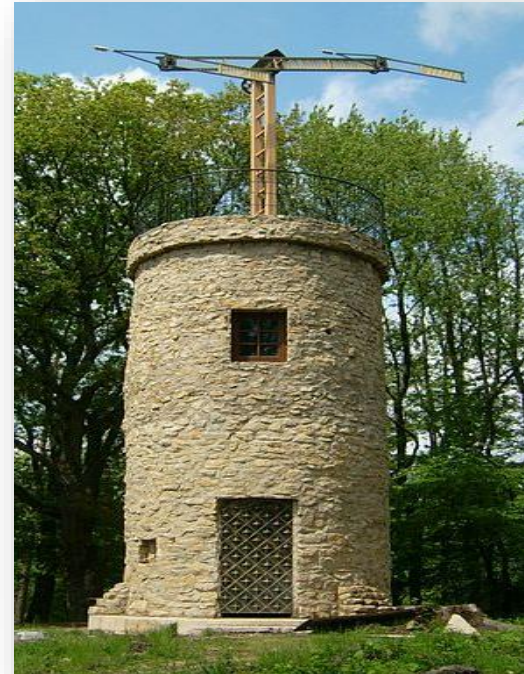
Outline

Brief history of networking

Brief history of the Internet



Martin Bodman



Lokilech

Fire Beacons
Carrier Pigeons
Human Messengers
Horse Relays ...

Flags
Heliographs: sun's rays & reflector
Telescopes

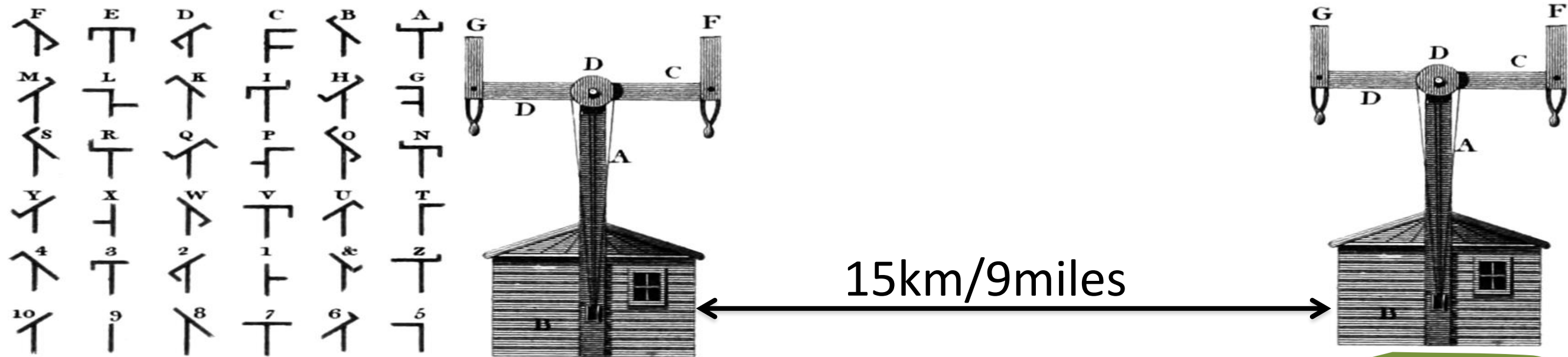
Semaphore telegraphs
Chappe (France)
Edelcrantz (Sweden)

Telephone

Internet

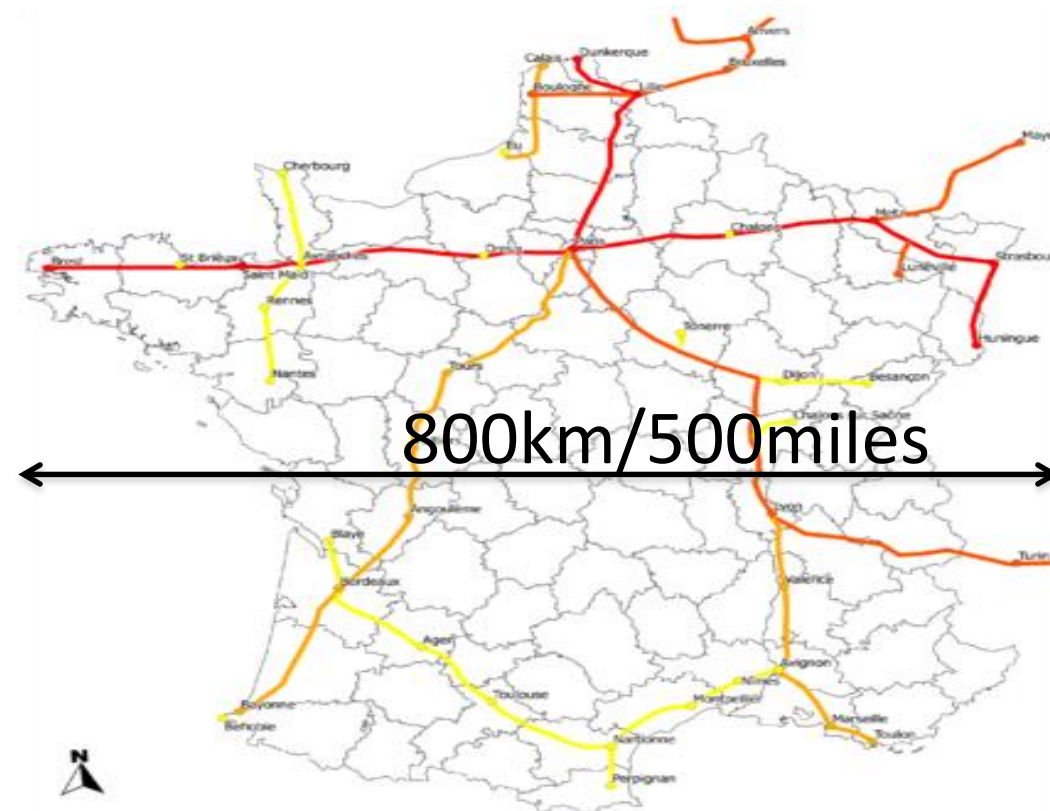


The Telegraph



1. **Codes:** Start of TX, End, WAIT, ERROR, FAILURE, FOG,...
2. **Flow Control:** To stop sender overwhelming the receiver.
3. **Synchronization:** To indicate that one symbol ended.
4. **Error correction and retransmission:** when symbols were misunderstood.
5. **Encryption:** So a message could not be intercepted.

Chappe Network in France (c 1830)



Source: Jeunamateur

Four steps of invention

(2,000 BC) Systems to signal a small set of pre-defined messages, e.g. beacons.

(1600s) Systems to transmit arbitrary messages, e.g. by encoding the alphabet.

(1700s) Numeric codes for common words and phrases. “Compression”.

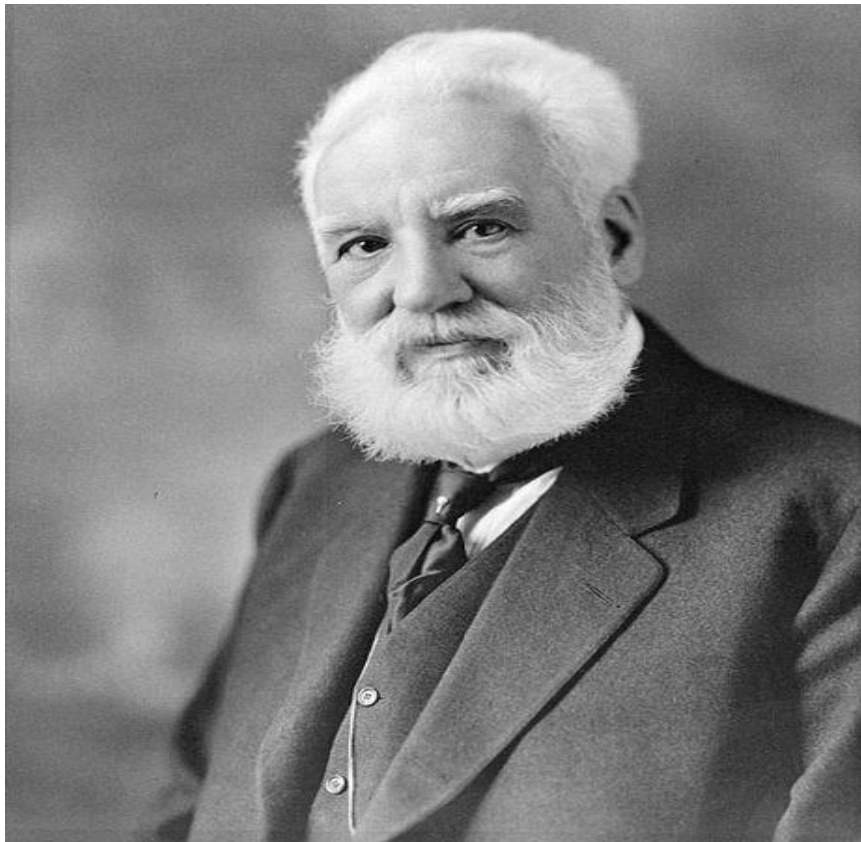
(1700s) Codes for control signals. “Protocols”.

Protocol Signals by 1800

1. Initialization
2. Error control: erase, resend, stop/wait, selective-repeat.
3. Flow control: “faster/slower”.

Telephone networks in 1900

(1876) Alexander Graeme Bell made the first telephone call



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Outline

Brief history of Networking

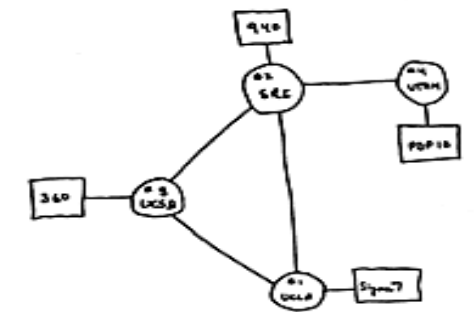
Brief history of the Internet

Parallel beginnings



J.C.R. Licklider describes an Intergalactic Network connecting everyone on the globe.

Four nodes interconnected
(UCLA, SRI, UCSB, Utah)



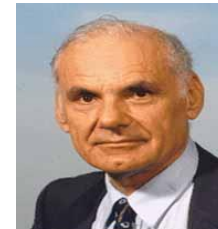
RAND (Paul Baran) Packet switching for survivable networks.



MIT (Kleinrock) First paper on packet switching theory.



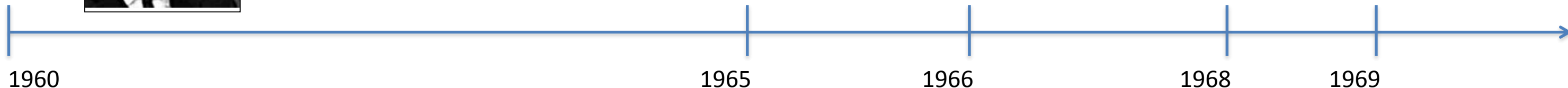
NPL, UK (Davies) Packet network.



DARPA (Roberts) plans for "ARPANET".

WAN connects two time-sharing computers

First "IMPs" (BBN).

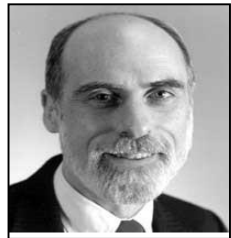


TCP/IP deployed

NSFNET, etc.

Cisco and IETF started

New networks appear:
ALOHAnet, Cyclades, IBM SNA.



“Internetting” and TCP born (DARPA),
led by
Vint Cerf and Bob Kahn.



1st Web browser

200 hosts on
ARPAnet

100,000 hosts on Internet

1970

1980

1990

Useful References

1. The Early History of Data Networks
G. J. Holzmann, B. Pehrson, IEEE Press 1994.

1. The Design Philosophy of the
DARPA Internet Protocols.
D. Clark, ACM Sigcomm 1988

2. Brief History of the Internet
B. M. Leiner, V. Cerf, D. D. Clark et al.
<http://www.internetsociety.org/internet/internet-51/history-internet/brief-history-internet>

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